IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Bristow et al.	)	
	)	Group Art Unit: 1732
Serial No.: 10/805,760	)	
	)	
Filed: March 22, 2004	)	Examiner: Monica Anne Huson
	)	
For: METHODS OF FORMING A LAYERED ARTICLE	)	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE

Sir:

This Amendment is submitted in response to the Office Action dated July 13, 2006.

Please amend the Application as follows:

IN THE CLAIMS

1. (Original) A method of forming a layered article, the method comprising:

thermoforming a substrate sheet to form a shaped substrate, wherein the shaped substrate is a fiber-reinforced plastic material having a void content sufficient to allow a vacuum to be applied through the shaped substrate;

pulling a vacuum through the shaped substrate; and

pulling a film layer onto a surface of the shaped substrate to form the layered article.

2. (Original) The method of Claim 1, wherein the film layer further comprises a compatible layer.

3. (Original) The method of Claim 1, wherein the void content is greater than or equal to about 5 vol.%, based on the total volume of the shaped substrate.

4. (Original) The method of Claim 3, wherein the void content is about 10 vol.% to about 50 vol.%.

5. (Original) The method of Claim 4, wherein the void content is about 25 vol.% to about 50 vol.%.

6. (Original) The method of Claim 1, wherein the fibers have a fiber diameter of about 6 micrometers to about 25 micrometers, and a fiber length of about 2 millimeters to about 75 millimeters.

7. (Currently Amended) The method of Claim 1, wherein the shaped substrate is ~~forminated~~ foraminated.

8. (Original) The method of Claim 1, wherein the shaped substrate is an open-celled, fiber-reinforced plastic material.

9. (Original) The method of Claim 1, wherein the substrate sheet comprises:

about 25 wt.% to about 75 wt.% plastic material;

about 25 wt.% to about 75 wt.% fibers; and

wherein weight percents are based on a total weight of the substrate sheet.

10. (Original) The method of Claim 9, wherein the substrate sheet comprises:

about 35 wt.% to about 65 wt.% plastic material; and

about 35 wt.% to about 65 wt.% fibers.

11. (Original) The method of Claim 9, wherein the plastic material is selected from the group consisting of polycarbonate, polyester, polyetherimide, polyphenylene ether, polystyrene, polyamide, and combinations comprising at least one of the foregoing.

12. (Original) The method of Claim 1, wherein the substrate sheet is thermoformed with a membrane assisted vacuum pressure forming method with a plug-assist.

13. (Original) The method of Claim 1, further comprising disposing a tie-layer between the shaped substrate and the film layer.

14. (Original) The method of Claim 1, wherein thermoforming the substrate sheet further comprises heating the substrate to a temperature sufficient to allow lofting of the fibers.

15. (Original) The method of Claim 14, wherein the temperature is about 450°F (about 232°C) to about 700°F (about 371°C).

16. (Original) The method of Claim 1, wherein the substrate sheet further comprises a non-woven scrim disposed on a surface of the substrate sheet.

17. (Original) A method of forming a layered article, the method comprising:

heating a substrate sheet to a temperature sufficient to allow lofting of fibers of the substrate sheet;

disposing the substrate sheet against a membrane assisted pressure box;

pushing the substrate sheet onto a mold to form a shaped substrate;

heating a film layer;

disposing the film layer adjacent to the shaped substrate;

pulling a vacuum through the shaped substrate; and

pulling the film layer against the shaped substrate to form the layered article.

18. (Original) The method of Claim 17, wherein the shaped substrate is a fiber-reinforced plastic material having a void content of greater than or equal to about 5 vol.%, based upon the total volume of the shaped substrate.

19. (Original) The method of Claim 18, wherein the void content is about 10 vol.% to about 50 vol.%.

20. (Original) The method of Claim 17, further comprising disposing a tie-layer between the shaped substrate and the film layer.

REMARKS

Claims 1-20 are pending in the present Application. No claims have been canceled or added and Claim 7 has been amended, leaving Claims 1-20 for consideration upon entry of the present Amendment.

Claim 7 has been amended to correct a typographical error. Support for this amendment can at least be found in Paragraph [0022] as originally filed.

No new matter has been introduced by these amendments or new claims. Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Claim Rejections Under 35 U.S.C. § 102(b)

Claims 17 and 20 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 4,529,641 to Holtrop et al. Applicants respectfully traverse this rejection.

It is first noted, and conceded by the Examiner, that Holtrop et al. do not teach a "fiber-reinforced plastic material" (Office Action dated July 13, 2006, hereinafter "OA 07/06", page 3). To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987) Since Applicants' Claim 17 explicitly claims "fibers of the substrate sheet", and Holtrop et al. fail to teach fibers, for at least this reason, Holtrop et al. clearly fail to anticipate all the elements of the Applicants' claim.

Furthermore, Holtrop et al. fail to teach "heating a substrate sheet to a temperature sufficient to allow lofting of fibers of the substrate sheet" as claimed by Applicants in Claim 17.

The Examiner contends that

> heating the sheet is the positively-claimed method step, while "[allowing] lofting of fibers" is only an intended use of the heating step, and therefore, not a positively recited method step.

(OA 07/06, page 2) Applicants respectfully disagree. Applicants aver that "lofting the fibers" specifies the degree of heating; e.g., the temperature to which the sheet must be heated, i.e. a temperature sufficient to allow lofting of fibers. Hence, the claim element "sufficient to allow lofting of fibers..." is not merely an "intended use of the heating step"; it is a positively-claimed method step.

Holtrop et al. do not teach fibers and do not teach heating to a temperature sufficient to allow lofting of the fibers. Hence, again, Holtrop et al. fail to anticipate Applicants' claims.

Furthermore, the Examiner contends that Holtrop et al. teach "disposing the substrate sheet against a pressure box" (OA 07/06, page 2); however, again, Applicants respectfully disagree. Holtrop et al. disclose

> [t]he preheated laminate is then inserted into a thermoformer where a source of pressured gas, for instance air is connected to the blow pin[,] and mold blocks close on to those portions of the laminate to be adhered between the two layers of foamed thermoplastic....
>
> In some instances it is also advantageous to apply vacuum to the mold cavities to assist in expanding non-adhered sections of the foamed thermoplastic.

(Col. 4, line 59 - Col. 5, line 5). Holtrop et al. fail to teach "disposing the substrate sheet against a membrane assisted pressure box", fail to teach "disposing the film layer adjacent to the *shaped* substrate", fail to teach "pulling a vacuum *through* the shaped substrate", and fail to teach "pulling the film layer against the *shaped* substrate to form the layered article". The section of Holtrop et al. cited by the Examiner merely teaches a thermoforming process where a blow pin is inserted between laminated layers, and the laminated layers are heated, placed in a mold, and the mold blocks are closed. Optionally a vacuum is applied to the mold cavities. Holtrop et al. at least fail to teach or mention a membrane assisted pressure box, disposing the film layer adjacent to the *shaped* substrate, pulling a vacuum *through* the shaped substrate, and pulling the film layer against the *shaped* substrate to form the layered article. They also fail to teach disposing a tie layer between the *shaped substrate* and the film layer. Hence, Holtrop et al. fail to anticipate the present claims. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-2, 6-7, and 9-16 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Holtrop et al. in view of U.S. Patent No. 5,854,149 to Nagayama et al. Applicants respectfully traverse this rejection.

The Examiner concedes that "Holtrop does not specifically show a fiber-reinforced plastic material", and as such she relies upon Nagayama et al. to "...show that it is known to

carry out a method including thermoforming a fiber-reinforced plastic having a void content". (OA 07/06, page 3)

It is first noted that merely "having a void content" is not a teaching of "having void content sufficient to allow a vacuum to be applied through the shaped substrate". (Claim 1) As noted above, Holtrop et al. fail to teach "pulling a vacuum *through* the shaped substrate". They also at least fail to teach a fiber reinforced material and fail to teach a "void content sufficient to allow a vacuum to be applied through the shaped substrate". Nagayama et al. fail to teach several elements of the present claim, including a "void content sufficient to allow a vacuum to be applied through the shaped substrate". Hence, Nagayama et al. fail to remedy the deficiencies of Holtrop et al.

Furthermore, the Examiner states that

> Nagayama and Holtrop are combinable because they are concerned with a similar technical field...and it would be prima facie obvious to one of ordinary skill in the art at the time the invention was made to use Nagayama's fiber-reinforced plastic material as that in Holtrop's molding process in order to produce an article which satisfies certain end-use foamed- plastic reinforcement specifications.

(OA 07/06, pages 3-4) Applicants note that obviousness is not based upon what an artisan could do or what an artisan may try, but is based upon what an artisan would be motivated to do with an expectation of success. "Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, No. 04-1616 (CAFC March 22, 2006) citing *In re Lee*, 277 F.3d 1338, 1343-46 (Fed. Cir. 2002); and *In re Rouffett*, 149 F.3d 1350, 1355-59 (Fed. Cir. 1998). "When the [Examiner] does not explain the motivation, or the suggestion or teaching, that would have led the skilled artisan at the time of the invention to the claimed combination as a whole, [it is] infer[ed] that the [Examiner] used hindsight to conclude that the invention was obvious." *Id.*

Here, the Examiner provides merely conclusory motivation, i.e. "in order to produce an article which satisfies certain end-use foamed- plastic reinforcement specifications", to allegedly attain the claimed invention. Nagayama et al. specifically disclose making a mixture of thermoplastic resin and reinforcing fibers to obtain a sheet-like web (Abstract) while Holtrop et al. is completely silent to reinforcing fibers and solely teach a "twin-sheet thermoformable

laminate structure" (Abstract). There is no teaching, suggestion, or motivation to combine the reinforcing fibers of Nagayama et al. with the molding method of Holtrop et al., and there is no expectation of success. There is no explanation of how such substitution would, could, or might affect the foamed thermoplastic, the final article, or the specific thermoforming method of Holtrop et al. Since no motivation (besides a merely conclusory statement) and no expectation of success have been provided, no *prima facie* case of obviousness has been established.

Regarding dependent Claims 2, Holtrop et al., Col. 5, lines 9 – 14 are cited as allegedly teaching a film layer further comprising a compatible layer. (OA 07/06, page 4). However, this section of Holtrop et al. states:

> Twin-sheet thermoforming can also be effected with two layers of foamed thermoplastic sheets with no adhesive between inner surfaces. In such case the heat provided during the thermoforming process can cause adhesion between the sheet by allowing polymer material to fuse at points of contact.

It is not understood how this section allegedly teaches "a film layer further comprising a compatible layer".

With respect to Claim 6, Nagayama et al. allegedly teach carrying out "***a*** method" wherein the fibers have a particular diameter and length. However, the mere use of particular fibers in a different process does not in any way render obvious the specifically claimed fibers in the specifically claimed process of the present claims.

Regarding Claim 7 it is alleged that Holtrop et al. "show[] a [foraminated] substrate... meeting applicant's claims". (OA 07/06, page 4)

Specifically regarding Claim 7, the Examiner contends that "foamed articles can be considered as being foraminated, i.e. having holes." (OA 07/06, page 4) However, Applicants noted in the specification that "the term 'foraminated' is used throughout this disclosure merely for convenience to discuss systems having holes *other than* those formed by a network of cells in fluid communication with each other." (Paragraph [0022], *emphasis* added). As such, Holtrop et al. fail to teach a foraminated substrate as presently claimed.

It is further noted that Applicants claim a foraminated substrate having a void content sufficient to allow a vacuum to be applied through the shaped substrate. Holtrop et al. do not teach a substrate with a particular void content, Nagayama et al. fail to teach a substrate having a

void content sufficient to allow a vacuum to be applied through the shaped substrate, and hence these references do not teach a substrate meeting Applicants claims.

It is also alleged that Nagayama et al. show a method wherein the substrate comprise about 35 wt% to about 75 wt% plastic material and about 35 wt% to about 65 wt% fibers. (OA 07/06, page 4). However, the cited section of Nagayama et al. states:

> In the invention, it is desirable that the compounding ratio of the reinforcing fibers and thermoplastic resin constituting the substrate is within a range of 10/90-70/30 as a weight ratio (fiber/resin). When the compounding ratio of the reinforcing fibers (content) is less than 10 wt %, the sufficient reinforcing effect through the reinforcing fibers can not be expected, while when the compounding ratio of the reinforcing fibers (content) exceeds 70 wt %, the thermoplastic resin as a binder component is lacking in the expansion and it is difficult to uniformly impregnate the resin into a contact point between the reinforcing fibers and hence the strength lowers.

(Col. 12, lines 15 – 26) This section does not discuss the amounts alleged in OA 07/06, does not teach the specifically claimed amounts, and there is no motivation to combine with Holtrop et al.

Regarding the tie layer, the membrane assisted vacuum pressure forming, and the temperatures sufficient to allow lofting, these elements are not taught by the references as discussed above. The references further fail to teach or suggest the specific temperatures. It is noted that merely because Nagayama et al. discuss different temperatures than Holtrop et al. is not motivation to use those temperatures in Holtrop et al. There is no expectation of success since the effect of the higher temperatures on the foam, adhesive,... of Holtrop et al. is not known or explained in OA 07/06.

Hence, no *prima facie* case of obviousness has been established, and Holtrop et al., even in view of Nagayama et al., fail to render the present claims obvious. Reconsideration and withdrawal of this rejection are respectfully requested.

Claims 3-5 and 8 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Holtrop et al. in view of Nagayama et al., and further in view of U.S. Patent No. 5,622,756 to Tokoro et al. Applicants respectfully traverse this rejection.

Specifically regarding, Claims 3-5 and 8, which stand rejected as allegedly unpatentable over Holtrop et al. in view of Nagayama et al. and in further view of Tokoro et al., it is first noted

that Holtrop et al. in view of Nagayama et al. fail to render Applicants claims as obvious for at least the reasons discussed above. It is also noted that as dependent claims to patentable independent Claim 1, these claims, are by definition, allowable.

The Examiner concedes that Holtrop et al. fail to teach a specific void content and therefore relies on Tokoro et al. to "show that it is known to carry out a method of molding a foamed polystyrene wherein the void content is greater than about 5 volume percent...". Applicants respectfully disagree. Firstly, Tokoro et al. specifically teach a polyolefin resin. (Abstract) Holtrop et al. in view of Nagayama et al fail to teach a polyolefin resin and instead teach polystyrene. Tokoro et al. explicitly disclose that since "there are the following points of difference between foamed particles of a polystyrene resin and foamed particles of a polyolefin resin, the technique for the polystyrene resin cannot be simply applied to the polyolefin resin". (Col. 2, lines 40-60) As such, for at least this reason, Tokoro et al. teach away from substituting its disclosed resin, i.e. a polyolefin, with the foamed polystyrene resin of Holtrop et al. as suggested by the Examiner.

Furthermore, the disclosed void volumes of greater than 5 volume percent as stated by the Examiner (Table 2) are the void volumes of ethylene-propylene copolymer resins. Since as discussed above, Holtrop et al. teach specific foam resins (e.g., polystyrene) and fail to teach polyolefin resins, there is no motivation for an artisan to combine the references. Applicants respectfully request reconsideration and withdrawal of these rejections.

Claims 18 and 19 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Holtrop et al. in view of Tokoro et al. Applicants respectfully traverse this rejection.

It is first noted that Claims 18 and 19 depend on patentable independent Claim 17 and are therefore, by definition, allowable.

The Examiner concedes that Holtrop et al. do not show a specific void content of the substrate and therefore relies on Tokoro et al. to

> show that it is known to carry out a method wherein the shaped substrate is a fiber-reinforced plastic material having a void content of greater than about 5 volume percent based on the total volume of the shaped substrate.

(OA 07/06, page 7)

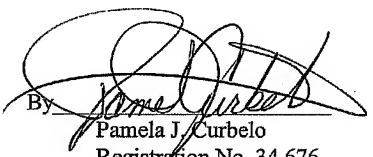
For at least the reasons discussed above, Applicants respectfully disagree that it would be obvious to combine Holtrop et al. with Tokoro et al. or that, even combined, the present application would be attained. Tokoro et al. teach a void content of greater than 5% for an ethylene propylene copolymer base resin. Moreover, Tokoro et al. teach "an expansion-molded article of a polyolefin resin". Since Holtrop et al. fail to teach a polyolefin resin as a possible thermoplastic material, there is no motivation for an artisan to combine the references. Again the Examiner provides merely conclusory motivation to combine the references, i.e. in order to produce an article, which satisfies certain end-use void specifications. There is no explanation of how such combination would, could, or might affect the thermoforming of Holtrop et al. In fact, Tokoro et al. actually disclose that the "techniques for the polystyrene resin cannot be simply applied to the polyolefin resin". (Col. 2, lines 42-44) Specifically, Tokoro et al. disclose that polyolefins have different fusion bonding temperatures, secondary expandability and shrinkage of the molded article than polystyrenes. (Col. 2, lines 44-60) Moreover, Tokoro et al. teach that it is "difficult to integrally mold the foamed particles of the polyolefin resin by filling them into a mold and heating them." (Col.2, lines 62-65) As such, it is apparent that there is no expectation of success and that an artisan would not be motivated to substitute an expanding polyolefin disclosed by Tokoro et al. with a polystyrene disclosed by Holtrop et al. No *prima facie* case of obviousness has been established. Reconsideration and withdrawal of this rejection are respectfully requested.

It is believed that the foregoing amendment and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejections and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 50-3622.

Respectfully submitted,

CANTOR COLBURN LLP



By_____
Pamela J. Curbelo
Registration No. 34,676

Date: August 9, 2006
CANTOR COLBURN LLP
55 Griffin Road South
Bloomfield, CT 06002
Telephone (860) 286-2929
Facsimile (860) 286-0115
Customer No.: 23413